

CLAIMS

What is claimed is:

1. An aqueous dispersion comprising:  
     water,  
     5       a polydioxothiophene,  
     a colloid-forming polymeric acid, and  
     a water-miscible organic liquid,  
 wherein the weight ratio of organic liquid to total polymer is at least 0.1.
2. The aqueous dispersion of Claim 1, wherein the dispersion has  
 10 a pH in the range of from about 1 to 8 and further comprises at least one  
 selected from a conductive polymer, metal particles, graphite fibers,  
 graphite particles, carbon nanotubes, carbon nanoparticles, metal  
 nanowires, organic conductive inks, organic conductive pastes, inorganic  
 conductive inks, inorganic conductive pastes, charge transport materials,  
 15 semiconductive inorganic oxide nano-particles, insulating inorganic oxide  
 nano-particles, piezoelectric oxide nano-particles, piezoelectric polymers,  
 pyroelectric oxide nano-particles, pyroelectric polymers, ferroelectric  
 oxide nano-particles, ferroelectric polymers, dispersing agents,  
 crosslinking agents and combinations thereof.
- 20 3. The aqueous dispersion of Claim 1, wherein the weight ratio of  
 organic liquid to total polymer is in a range of from about 0.3 to 5.0.
4. The aqueous dispersion of Claim 1, wherein at least one  
 organic liquid has a boiling point greater than 100°C.
5. The aqueous dispersion of Claim 1, wherein the organic liquid is  
 25 selected from N-methylpyrrolidone, ethylene glycol, dimethylacetamide,  
 dimethyl formamide, dimethylsulfoxide, and combinations thereof.
6. The aqueous dispersion of Claim 1, wherein the organic liquid  
 comprises diethylene glycol.
7. The aqueous dispersion of Claim 1, wherein the organic liquid  
 30 comprises N-methylpyrrolidone.
8. The aqueous dispersion of Claim 1, wherein the  
 polydioxothiophene comprises poly(3,4-ethylenedioxythiophene).
9. The aqueous dispersion of Claim 1, wherein the colloid-forming  
 polymeric acid comprises a perfluoroalkylenesulfonic acid.
- 35 10. A method for producing an aqueous dispersion comprising:  
     (a) providing a aqueous mixture of water and at least one  
     dioxothiophene monomer;

- (b) providing an aqueous dispersion of at least one polymeric acid;
- (c) combining the dioxothiophene mixture with the aqueous dispersion of colloid-forming polymeric acid,
- 5 (d) combining a oxidizing agent and a catalyst, in any order, with the aqueous dispersion of the colloid-forming polymeric acid before or after the combining of step (c), to form an aqueous dispersion of polydioxothiophene and polymeric acid colloids, and
- 10 (e) adding a water-miscible organic liquid, wherein the weight ratio of organic liquid to total polymer is at least about 0.1.
11. The method of Claim 10 where at least one co-acid is included in the polymerization.
12. The method of Claim 11 further comprising a step of contacting
- 15 the aqueous dispersion of polydioxothiophene and colloid-forming polymeric acid with at least one ion exchange resin.
13. The method of Claim 12, wherein the aqueous dispersion of polydioxothiophene and colloid-forming polymeric acid is contacted with a cation exchange resin and then with an anionic exchange resin.
- 20 14. The method of Claim 12, where the method further includes adding at least one conductivity additive.
15. An organic electronic device comprising at least layer made from a composition comprising:
- 25 water,  
a polydioxothiophene,  
a colloid-forming polymeric acid, and  
a water-miscible organic liquid,
- wherein the weight ratio of organic liquid to total polymer is at least about 0.1.
- 30 16. The device Claim 15, wherein the composition has a pH in the range of from about 1 to 8.
17. The device of Claim 15, wherein the weight ratio of organic liquid to total polymer is in a range of from about 0.3 to 5.0.
18. The aqueous dispersion of Claim 1, wherein the organic liquid
- 35 has a boiling point greater than 100°C.
19. The aqueous dispersion of Claim 1, wherein the organic liquid is selected from N-methylpyrrolidone, ethylene glycol, diethylene glycol,

dimethylacetamide, dimethyl formamide, dimethylsulfoxide, and combinations thereof.

20. The device of Claim 1, wherein composition comprises a perfluoroalkylenesulfonic acid.

5        21. A device of Claim 15, at least one layer comprising the composition is a buffer layer that has been heated to a temperature of at least about 40°C.

10        22. A device of Claim 15, wherein the composition further comprises at least one selected from polymers, dyes, coating aids, carbon nanotubes, metal particles, graphite fibers, graphite particles, carbon particles, carbon nanoparticles, metal nanowires, organic conductive inks, organic conductive pastes, inorganic conductive inks, inorganic conductive pastes, charge transport materials, crosslinking agents, and combinations thereof.

15        23. The device of claim 15, wherein the device is selected from a light emitting diode, light emitting diode display, diode laser, photoconductive cell, photosensor, photoresistor, photoswitch, phototransistor, phototube, IR detector, photovoltaic device, solar cell, transistor, diode, memory storage device, electrochromic display,  
20        electromagnetic shielding device, and biosensor.